CLAIMS

We claim:

1. A method of forming a waveguide, comprising the steps of:

providing a structure;

forming an underclad layer over the structure;

forming a core layer over the underclad layer; and

patterning:

the core layer to form the waveguide; and

partially into the underclad layer, forming an overetched underclad layer having a projection underneath the waveguide; the waveguide having stress gradients and the overetched underclad layer having stress gradients.

2. The method of claim 1, wherein the structure is comprised of silicon, silicon oxide, glass or GaAs; the underclad layer is comprised of silica or GaAsP; and the core layer is comprised of silica, Ge doped silica, or B, P and Ge doped silica.

3. The method of claim 1, wherein the structure is comprised of silicon; the underclad layer is comprised of silica; and the core layer is comprised of silica.

4. The method of claim 1, wherein the structure is from about 0.20 to 1.50 mm thick; the underclad layer is from about 5.00 to 25.00 μm thick and the core layer is from about 3.00 to 10.00 μm thick.

5. The method of claim 1, wherein the structure is about 1.00 mm thick, the underclad layer is about 15.00 μm thick and the core layer is about 6.00 μm thick.

6. The method of claim 1, wherein the underclad layer has a width and the underclad layer is overetched about one-half its width.

7. The method of claim 1, wherein the underclad layer has a width of about 6.00 μm and is overetched about 3.00 μm.

8. The method of claim 1, wherein the waveguide is from about 0.50 to 6.00 μm wide.

9. The method of claim 1, wherein the waveguide is about 6.00 μm wide.

10. The method of claim 1, including the step of forming an overclad layer over the waveguide and the overetched underclad layer.

11. The method of claim 1, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer being comprised of a material that optically matches the underclad layer.

12. The method of claim 1, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer being comprised of silica, glass or GaAS..

13. The method of claim 1, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer being comprised of silica.

14. The method of claim 1, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer having a thickness of from about 0.50 to 6.00 μm.

15. The method of claim 1, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer having a thickness of from about 2.00 to 4.00 μm.

16. The method of claim 1, wherein the overetching of the underclad layer lowers the stress gradients from the waveguide into the projection of the overetched underclad layer.

17. The method of claim 1, wherein the stress-induced birefringence of the waveguide is reduced.

18. The method of claim 1, wherein the polarization sensitivity of the waveguide is reduced.

19. The method of claim 1, wherein the coefficient of thermal expansion for the substrate and the core layer are different.

20. A method of forming a waveguide, comprising the steps of:

providing a structure;

forming an underclad layer over the structure;

forming a core layer over the underclad layer;

patterning:

the core layer to form the waveguide; and

partially into the underclad layer, forming an overetched underclad layer having a projection underneath the waveguide; the waveguide having stress gradients and the overetched underclad layer having stress gradients; and

forming an overclad layer over the waveguide and the overetched underclad layer.

21. The method of claim 20, wherein the structure is comprised of silicon, silicon oxide, glass or GaAs; the underclad layer is comprised of silica or GaAsP; and the core layer is comprised of silica, Ge doped silica, or B, P and Ge doped silica.

22. The method of claim 20, wherein the structure is comprised of silicon; the underclad layer is comprised of silica; and the core layer is comprised of silica.

23. The method of claim 20, wherein the structure is from about 0.20 to 1.50 mm thick; the underclad layer is from about 5.00 to 25.00 μm thick and the core layer is from about 3.00 to 10.00 μm thick.

24. The method of claim 20, wherein the structure is about 1.00 mm thick, the underclad layer is about 15.00 μm thick and the core layer is about 6.00 μm thick.

25. The method of claim 20, wherein the underclad layer has a width and the underclad layer is overetched about one-half its width.

26. The method of claim 20, wherein the underclad layer has a width of about 6.00 μm and is overetched about 3.00 μm.

27. The method of claim 20, wherein the waveguide is from about 0.50 to 6.00 μm wide.

28. The method of claim 20, wherein the waveguide is about 6.00 μm wide.

29. The method of claim 20, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer being comprised of a material that optically matches the underclad layer.

30. The method of claim 20, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer being comprised of silica, glass or GaAS..

31. The method of claim 20, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer being comprised of silica.

32. The method of claim 20, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer having a thickness of from about 0.50 to 6.00 μm.

33. The method of claim 20, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer having a thickness of from about 2.00 to 4.00 μm.

34. The method of claim 20, wherein the overetching of the underclad layer lowers the stress gradients from the waveguide into the projection of the overetched underclad layer.

35. The method of claim 20, wherein the stress-induced birefringence of the waveguide is reduced.

36. The method of claim 20, wherein the polarization sensitivity of the waveguide is reduced.

37. The method of claim 20, wherein the coefficient of thermal expansion for the substrate and the core layer are different.

38. A method of forming a waveguide, comprising the steps of:

providing a structure;

forming an underclad layer over the structure; the underclad layer having a width;

forming a core layer over the underclad layer; and

patterning:

the core layer to form the waveguide; and

partially into the underclad layer about one-half of its width, forming an overetched underclad layer having a projection underneath the waveguide; the waveguide having stress gradients and the overetched underclad layer having stress gradients.

39. The method of claim 38, wherein the structure is comprised of silicon, silicon oxide, glass or GaAs; the underclad layer is comprised of silica or GaAsP; and the core layer is comprised of silica, Ge doped silica, or B, P and Ge doped silica.

40. The method of claim 38, wherein the structure is comprised of silicon; the underclad layer is comprised of silica; and the core layer is comprised of silica.

41. The method of claim 38, wherein the structure is from about 0.20 to 1.50 mm thick; the underclad layer is from about 5.00 to 25.00 μm thick and the core layer is from about 3.00 to 10.00 μm thick.

42. The method of claim 38, wherein the structure is about 1.00 mm thick, the underclad layer is about 15.00 μm thick and the core layer is about 6.00 μm thick.

43. The method of claim 38, wherein the underclad layer has a width of about 6.00 μm and is overetched about 3.00 μm.

44. The method of claim 38, wherein the waveguide is from about 0.50 to 6.00 μm wide.

45. The method of claim 38, wherein the waveguide is about 6.00 μm wide.

46. The method of claim 38, including the step of forming an overclad layer over the waveguide and the overetched underclad layer.

47. The method of claim 38, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer being comprised of a material that optically matches the underclad layer.

48. The method of claim 38, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer being comprised of silica, glass or GaAS..

49. The method of claim 38, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer being comprised of silica.

50. The method of claim 38, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer having a thickness of from about 0.50 to 6.00 μm.

51. The method of claim 38, including the step of forming an overclad layer over the waveguide and the overetched underclad layer; the overclad layer having a thickness of from about 2.00 to 4.00 μm.

52. The method of claim 38, wherein the overetching of the underclad layer lowers the stress gradients from the waveguide into the projection of the overetched underclad layer.

53. The method of claim 38, wherein the stress-induced birefringence of the waveguide is reduced.

54. The method of claim 38, wherein the polarization sensitivity of the waveguide is reduced.

55. The method of claim 38, wherein the coefficient of thermal expansion for the substrate and the core layer are different.